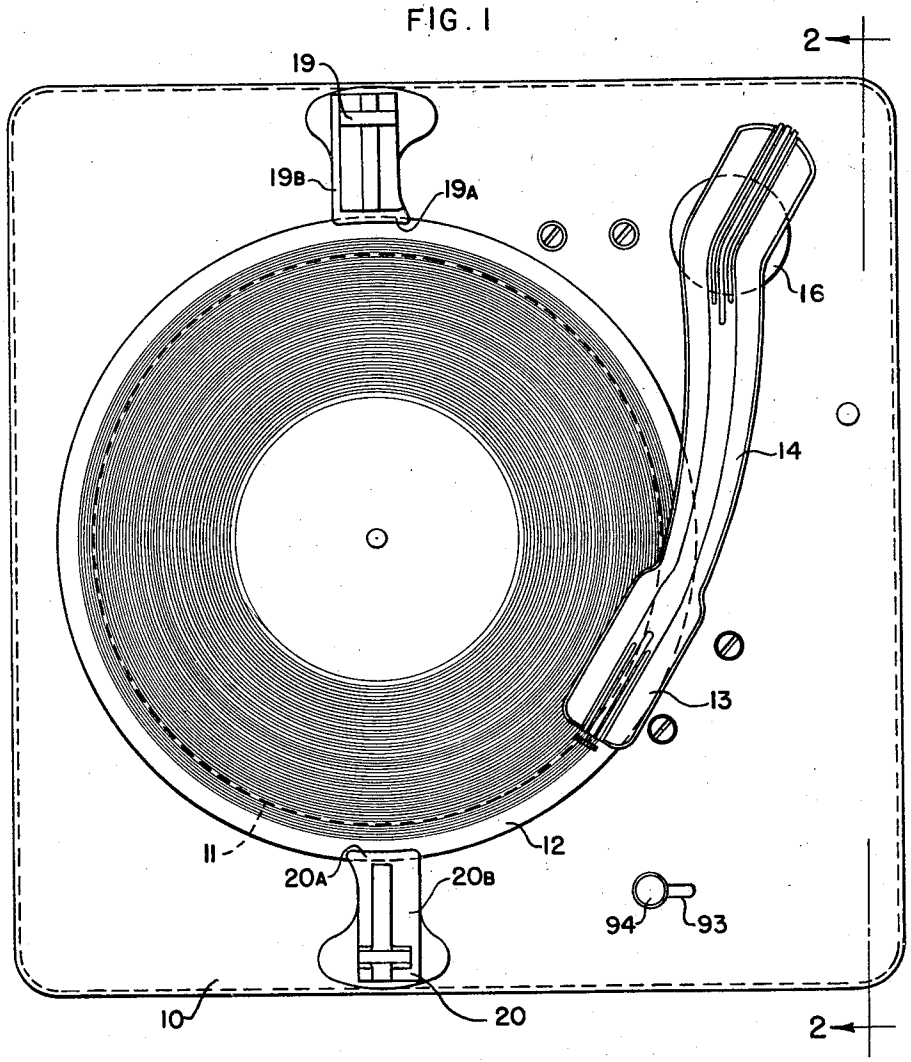
Oct. 13, 1942. C. E. TODD 2,298,988

TRIPPING MECHANISM FOR AUTOMATIC RECORD CHANGERS

Filed Oct. 26, 1940 4 Sheets-Sheet 1

FIG. 1



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TRIPPING MECHANISM FOR AUTOMATIC RECORD CHANGERS

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FIG. 2

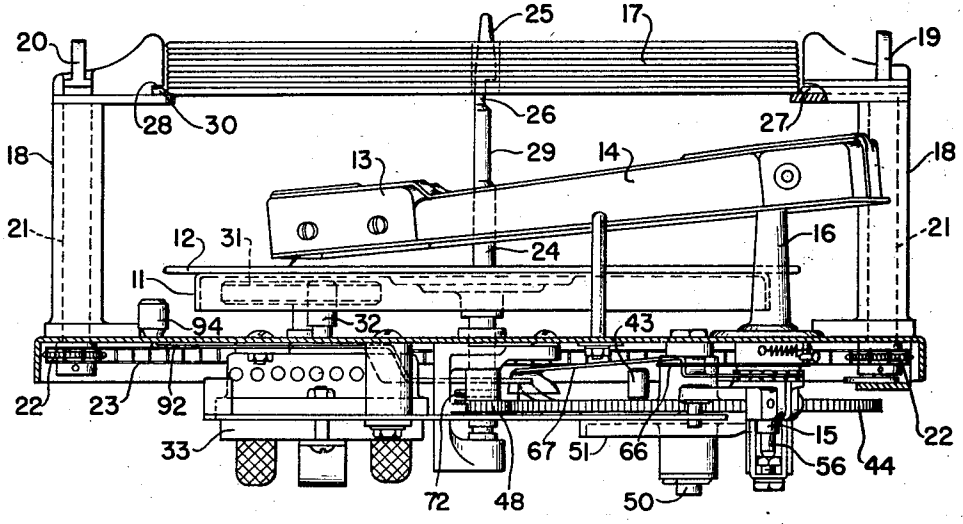
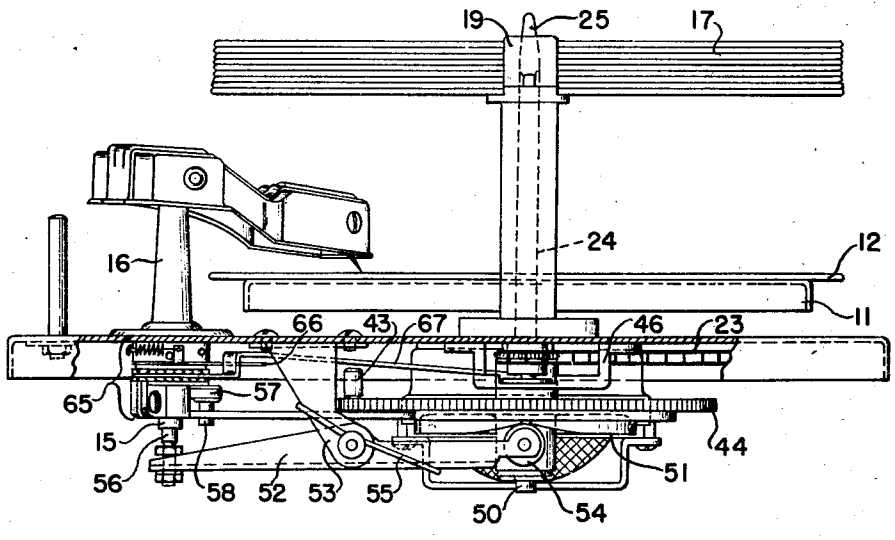


FIG. 3



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TRIPPING MECHANISM FOR AUTOMATIC RECORD CHANGERS

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FIG. 4

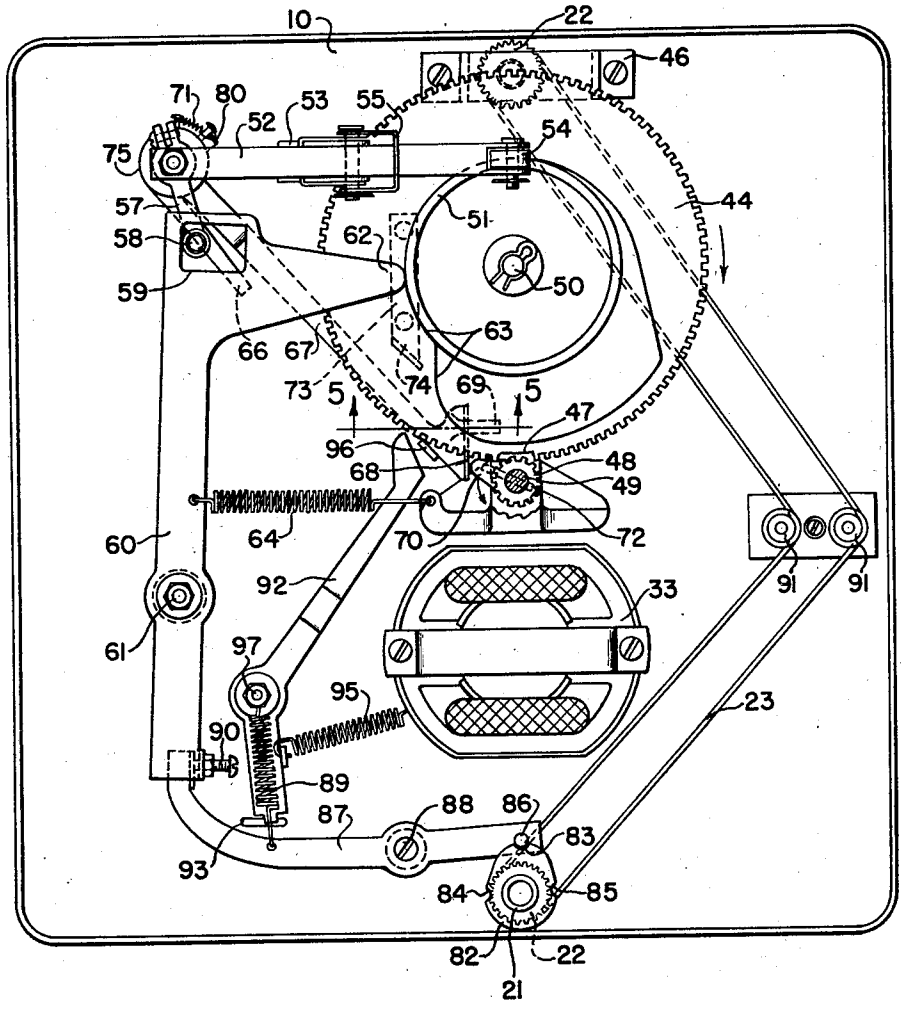
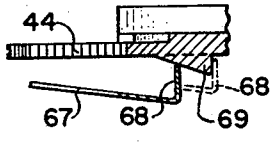


FIG. 5



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TRIPPING MECHANISM FOR AUTOMATIC RECORD CHANGERS

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FIG. 6

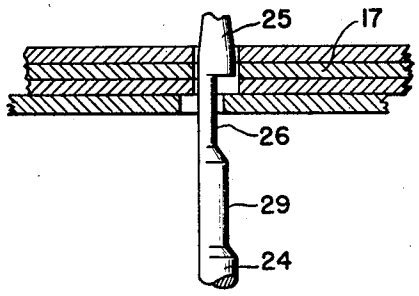


FIG. 7

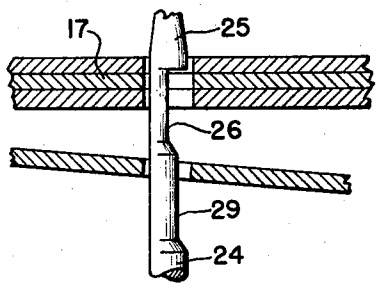


FIG. 8

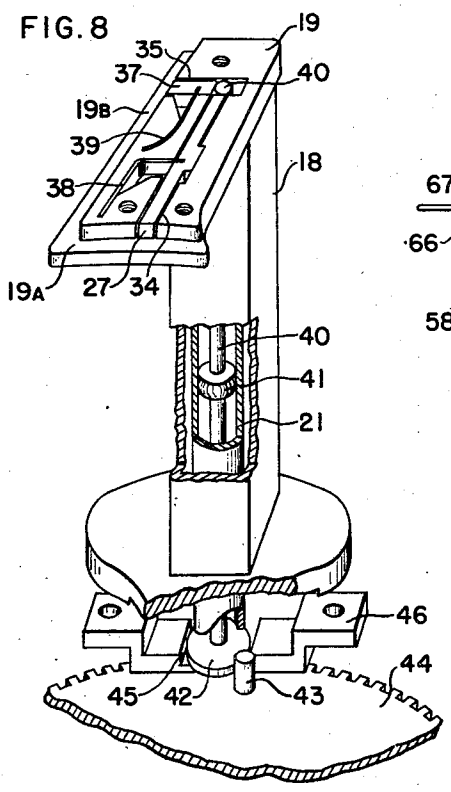
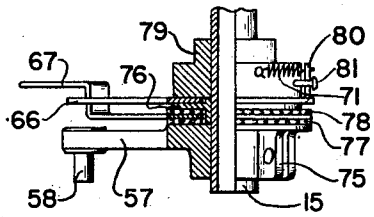


FIG. 9



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UNITED STATES PATENT OFFICE

2,298,988

TRIPPING MECHANISM FOR AUTOMATIC RECORD CHANGERS

Charles E. Todd, Fort Wayne, Ind., assignor to Farnsworth Television and Radio Corporation, a corporation of Delaware

Application October 26, 1940, Serial No. 362,896

5 Claims. (Cl. 274—10)

This invention relates to phonograph apparatus with automatic record-changing mechanism and more particularly to an improved tripping mechanism incorporated in the automatic record-changing mechanism.

An object of the present invention is to provide a tripping mechanism which may be assembled easily and which requires no fine adjustments for satisfactory operation.

Another object of the present invention is to provide a simple tripping mechanism which is actuated either when the pickup arm moves an abnormal distance during a revolution of the turntable or when the pickup arm reaches a predetermined distance from the center of the turntable.

A further object of the invention is to provide a tripping mechanism with fewer parts so that the mechanism may be built inexpensively.

In accordance with the present invention there is provided an automatic phonograph having a turntable and a movable pickup arm for cooperating with a record on the turntable. The phonograph also includes the combination of driving means movable with the turntable, an actuating means adapted to be moved into driving engagement with the driving means, coupling means slidably connected with the pick-up arm and adapted to be moved into the path of the driving means and maintained out of engagement with the actuating means by the driving means while the pickup arm is cooperating with a playing groove of a record on the turntable, and means bias-connected to said pickup arm and adapted to move the coupling means and to be moved thereby. After the pickup arm reaches a predetermined distance from the center of the turntable, the bias-connected means is adapted to move the coupling means into engagement with the actuating means. Thereafter, the driving means moves the coupling means and therewith the actuating means for moving the actuating means into driving engagement with the driving means.

In accordance with another feature of the invention, there is provided an automatic phonograph having a turntable, a movable pickup arm for cooperating with a record on the turntable and an initiating apparatus. The initiating apparatus includes driving means rotatable with the turntable and coupling means slidably connected with the pickup arm. The coupling means is adapted to be moved a predetermined distance in a first direction into the path of the driving means during a revolution of the turntable by a playing groove of a record on the turntable and is adapted to be moved more than the predetermined distance in the first direction during a revolution of the turntable by a tripping groove of a record on the turntable. After the coupling means is moved into the path of the driving means, the driving means is adapted to move the coupling means relative to the pickup arm a predetermined distance opposite to the first direction. The initiating apparatus also includes means bias-connected to the pickup arm and associated with the coupling means for moving the coupling means a distance greater than the predetermined distance in the first direction when the pickup arm reaches a predetermined distance from the center of the turntable and actuating means normally out of operative engagement with the driving means and adapted to be engaged by the coupling means when the coupling means is moved more than the predetermined distance in the first direction. After the coupling means is in engagement with the actuating means, the driving means moves the coupling means and therewith the actuating means. The movement of the actuating means brings it into operative engagement with the driving means.

In the drawings:

Fig. 1 is a top plan view of the record-changing apparatus with the unplayed records removed;

Fig. 2 is a side elevation of the record-changing apparatus of Fig. 1, showing a stack of records supported over the turntable and one record on the turntable in playing position, as viewed from line 2—2 of Fig. 1;

Fig. 3 is a rear elevation of the record-changing apparatus;

Fig. 4 is a bottom plan view, showing the under side of the record-changing apparatus;

Fig. 5 is a fragmentary view, showing the tripping lever and cam, as viewed from line 5—5 of Fig. 4;

Figs. 6 and 7 are fragmentary side elevation views showing various positions of records in relation to the centering spindle, at closely-spaced intervals of time after the lowermost record has been moved to release it from the supports;

Fig. 8 is a perspective view of one of the record supports with the cover removed and with the pedestal partially in section; and

Fig. 9 is a view of the friction clutch assembly used in the tripping mechanism.

Referring now more particularly to Fig. 1 of the drawings, the invention there illustrated is embodied in a record-changing apparatus hav-

ing a base plate 10 supporting a horizontally rotatable turntable 11 upon which is a record 12 in position for reproduction. A reproducer or pickup 13 is supported at one end of a pickup arm 14, which is pivoted at its opposite end about a vertical axis of a shaft 15 (shown in Fig. 3), which is rotatable within a pedestal 16 to permit the reproducer 13 to move across the face of the record as the stylus of the reproducer follows the spiral groove of the record.

Fig. 2, which is a side elevation of the record-changing apparatus, shows in greater detail the manner in which a number of unplayed records 17 are supported above the turntable on diametrically opposite record supports 18—18. These record supports extend upwardly from the base plate 10 to which they are fixedly secured. Supporting brackets 19 and 20 are provided at the upper ends of the supports 18—18. Shelf portions 19A and 20A (Fig. 1) on the brackets 19 and 20 engage the opposite peripheral edge portions of the lowermost record of a stack of records 10-inch or smaller. When the brackets 19 and 20 are rotated 90° in a manner presently to be described, shelf portions 19B and 20B (see Fig. 1) are brought into position to engage the opposite peripheral edge portion of the lowermost record of a stack of 12-inch or larger records.

The brackets 19 and 20 are mounted upon the upper ends of tubular shafts 21—21 which are rotatable about their vertical axes. Secured to the lower ends of the shafts 21—21 are sprocket wheels 22—22, clearly shown in Fig. 4. The sprocket wheels are joined by a link chain 23 so that they may move in unison to different positions. It evident that manual manipulation of either one of the brackets 19 or 20 from supporting position for 10-inch records to supporting position for 12-inch records or vice versa, causes a simultaneous movement of the other bracket to the corresponding supporting position. In a similar fashion, both of the brackets 19 and 20 may be rotated together to a position so that the played records may be removed readily from the turntable. This is accomplished by rotating the supports 19 or 20 shown in Fig. 1 90° in a clockwise direction. When the brackets are in supporting position for a stack of either 10-inch or 12-inch records, they may be locked in place in a manner hereinafter to be described in greater detail.

As shown in Fig. 2, the turntable 11 is provided with a centering spindle 24 which extends upwardly and terminates in a tapered portion 25. This tapered portion 25 greatly facilitates loading records upon the brackets 19 and 20. The spindle may be fixed or rotatable with the turntable. The preferred embodiment of the invention shown in the drawings includes a spindle that is rotatable with the turntable.

The spindle 24 is provided with a recess portion 26 formed on one side of the spindle. The recess portion of the spindle is so positioned along the vertical axis of said spindle as to permit the lowermost supported record to move into said recess portion regardless of whether said record is straight or warped. It is to be noted that the spindle 24 is long enough to pass through the centering apertures of all of the supported records. Thus the spindle cooperates with brackets 19 and 20 to maintain the supported records in a stable position. In apparatus including a rotatable recessed spindle, the rotation of the spindle about its axis is timed with the reciprocatory movement of a plunger 27 on the bracket 19, presently to be described in greater detail. In apparatus with a fixed recessed spindle, the spindle is positioned so that the recessed portion faces the bracket 19. The plunger 27 is arranged to engage a peripheral edge portion of the lowermost supported record and move it laterally so that the centering aperture of said record moves into the recess 26 of the centering spindle 24 and the opposite peripheral edge portion of said record moves into a notch 28 provided in the bracket 20. The notch 28 and the recess 26 permit the lowermost supported record to be moved sufficiently far to the left by the plunger 27 so that the right-hand edge of the record drops off of the shelf portion of the bracket 19.

When the lowermost supported record has been moved laterally in the manner just described to the position shown in the fragmentary view of Figure 6, the record is freed from the shelf portion of the right-hand bracket 19, and begins to fall at an angle to the turntable as shown in Fig. 7. The spindle 24 is provided with a second recessed portion 29 (Figs. 2, 6 and 7) to permit the released record to fall sufficiently far so that the released record will move out of engagement with the bracket 20.

The left-hand bracket 20 is provided with a small spring-biased pin 30, which prevents the lowermost record from moving laterally by vibration or otherwise into releasing position prior to the time when the record is moved by action of the plunger 27 in the bracket 19.

The turntable 11 is driven by a friction wheel 31, shown under the left-hand flange of the turntable in Fig. 2. The friction wheel 31 is operatively connected to a shaft 32 which is driven by an electric motor 33.

The detailed construction of the right-hand support is shown in Fig. 8. The bracket 19 is provided with a pair of channels 34 and 35 which support and guide in a reciprocatory motion plungers 27 and 37 respectively. Each of the plungers is biased by springs 38 and 39 respectively to the position shown in the drawings. The plungers 27 and 37 are actuated and moved against the biasing action of their respective springs by a pin 40 pivotally mounted within the hollow shaft 21 at 41. Fixedly secured to the lower end of the pin 40 is a cam 42 normally biased by the action of one of the springs 38 or 39, into the path of movement of a pin or roller 43 provided on an actuating means preferably in the form of a cam gear 44. The motion of the cam 42 is guided by a channel 45 provided in a bracket 46 affixed to the base plate 10.

The reciprocatory motion of the cam 42 is produced by said cam engaging the pin 43 on the cam gear 44 as the latter rotates, as will later be described. This reciprocatory motion of the cam 42 is transmitted by the pin 40 to one of the plungers 27 or 37. When the bracket 19 is in the position shown in Fig. 8, the spring-biased plunger 27 is moved in response to the reciprocatory motion of the pin 40 to disengage ten-inch records from the shelf portion 19A. Rotation of the bracket 19 counterclockwise through an angle of 90° places the plunger 37 in position to be actuated by the pin 40 to disengage twelve-inch records from the shelf portion 19B.

The cam gear 44 partially shown in Fig. 8 is shown fully in Fig. 4. Several teeth have been

removed from the cam gear 44 at 47. The purpose of the mutilation on the cam gear is to break the driving connection between the cam gear 44 and a pinion gear 48, fixedly secured to a shaft 49 which also supports the turntable 11. After each complete revolution of the cam gear 44, the driving connection with the pinion gear 48 is broken by the mutilated portion 47 and the cam gear 44 comes to a stop. One complete revolution of the cam gear 44 results in one record-changing cycle, as will become evident later.

When a record on the turntable has been completely played, the movement of the pickup arm 14 actuates the tripping mechanism, presently to be described, and causes the cam gear 44 to be moved sufficiently far so that its teeth mesh with the teeth of the pinion gear 48. The cam gear 44 thereupon is driven through a complete revolution about its axis 50 and comes to rest in the position shown in Fig. 4. As the cam gear 44 rotates, the pin 43 (see Fig. 8) on the cam gear 44 engages the cam 42 and as a result a record is moved from the supporting brackets 19 and 20 to playing position on the turntable in the manner heretofore described.

The cam gear 44 is provided with a cam surface 51 shown in Figs. 3 and 4. An arm 52, pivoted intermediate its ends on a bracket 53, which is fixed to the base plate 10, carries a roller 54 at one end, which is biased by a spring 55 into engagement with the cam surface 51. As the roller 54 follows the cam surface 51, it moves the left-hand end of the arm 52 upward. This movement raises a pin 56 vertically in the hollow shaft 15. The upper end of the pin 56 engages the underside of the pickup arm 14 and raises the pickup arm 14 vertically upward.

As appears in Fig. 3, a lever 57 is affixed to the lower end of the hollow shaft 15 for moving the pickup arm 14 in a horizontal plane. The free end of the lever 57 supports a pin 58 which moves within an aperture 59 in the heel of an L-shaped lever 60 (Fig. 4). The aperture 59 is sufficiently large so that the pin 58 may freely move with the lever 57 over a wide arc corresponding to the movement of the pickup arm 14, while playing a record. The L-shaped lever 60 is pivoted at 61. A toe 62 of the L-shaped lever 60 engages a cam surface 63 provided on the cam gear 44. The toe 62 is continuously biased toward the cam surface 63 by a spring 64. After the pickup arm 14 has been raised to bring the stylus out of engagement with the surface of the record in the manner previously described, and as the cam gear 44 continues to rotate, the cam surface 63 moves the L-shaped lever 60 in a counterclockwise direction (Fig. 4) about its axis 61 and causes the right-hand side of the aperture 59 to engage and drive before it the pin 58. The pin moves the lever 57 and therewith the pickup arm in a radial direction away from the center of the record. The cam surface 63 is so shaped that the L-shaped lever 60 ceases its counterclockwise rotation at a time when the pickup arm has moved beyond the edge of the turntable and any records thereon.

After the pickup arm 14 has been moved beyond the edge of a record on the turntable, the cam gear 44 continues to rotate and the pin 43 (Fig. 8) thereupon engages the cam 42 to cause the bottom supported record to be dropped into playing position upon the turntable 11 in a manner previously described. Shortly thereafter, the cam surface 63 has moved to a point where the toe 62 of the L-shaped lever 60 begins to move to the right (Fig. 4) under the action of a spring 64. When this occurs, the left-hand edge of the aperture 59 engages the pin 58 and drives before it the lever 57, and therewith the pickup arm 14 to a position where the stylus of the pickup arm is over the outermost groove of the record on the turntable.

By this time, the cam surface 51 on the cam gear 44 has rotated to the position shown in Fig. 3, where the contour of the cam permits the roller 54 to rise vertically and permitting the left-hand end of the lever 52 (Fig. 3) to drop vertically, thereby returning the stylus of the pickup arm 14 into playing engagement with the record on the turntable.

The automatic record-changing cycle effected by a complete revolution of the cam gear 44 is initiated by the automatic tripping mechanism, previously mentioned, which will now be described in greater detail. The pickup arm 14, which has been lowered to engage the stylus with the outermost groove of a record on the turntable 11, is moved inwardly by the stylus following the spiral playing groove on the record. In moving toward the center of the record, the pickup arm rotates the hollow shaft 15 to which is secured a clutch 65 shown in Figs. 3 and 9. The clutch 65 has associated therewith a resilient connecting means or a spring-biased member 66 and a coupling member or lever 67.

Referring particularly to Fig. 4, as reproduction goes on and the pickup arm 14 moves toward the center of the record, the clutch 65 moves the lever 66 in a counterclockwise direction (Fig. 4). The lever 66 engages the side of the lever 67 (more clearly shown in Fig. 3) and moves the lever 67 in a counterclockwise direction. A free end 68 of the lever 67 is preferably formed at right angles as is clearly shown in Fig. 5. This construction of lever 67 builds up a stress in the lever as it moves over cam 69 to assure a positive connection between lever 67 and cam 44 as shown in dotted lines in Fig. 5.

As the pickup arm 14 approaches the tripping groove of a record, the pickup arm moves the levers 66 and 67 in a counterclockwise direction (Fig. 4). When the lever 67 is moved inwardly, the bent end 68 engages a cam 69 provided on the cam wheel 44 (Figs. 4 and 5). As the bent end 68 moves along the cam 69, it moves in the path of a cam or projection 70, which is fixed to the shaft 49. The cam 70 periodically strikes the bent end 68 and moves the lever 67 in a clockwise direction, whereby the lever 67 changes its position with respect to the pickup arm by virtue of the clutch 65. The clutch 65 is so adjusted on the shaft 15 that the lever 67 moves into engagement with the lever 66 when the pickup arm reaches a predetermined distance from the center of the turntable. Thereafter, the lever 67 can be moved in a clockwise direction (Fig. 4) only against the tension of the spring 71. When the stylus of the pickup arm 14 moves into the tripping groove customarily provided as the inner groove of the record, the pickup arm and the shaft 15 are moved during one revolution of the turntable a distance greater than the distance the pickup arm and the shaft 15 are moved during one revolution of the turntable by a playing groove. However, the operation of applicant's tripping mechanism is not limited to this type of tripping groove. It is clear from the description herein that applicant's tripping mechanism can be operated either by an abnormal movement of the pickup arm 14 during one revolution of the shaft 49 or by mov-

ing the pickup arm 14 to a predetermined position from the center of the turntable 11. The movement of the pickup arm 14 is imparted to levers 66 and 67 by means of the clutch 65 and the spring 71. As a result of the greater movement of lever 67 or of its movement in response to the movement of the pickup arm 14 to a predetermined distance from the center of the turntable, one of two things happens. Lever 67 may swing past cam 70 into tripping position as shown in dotted lines in Fig. 5, or the cam 70 may engage and reverse the movement of lever 67 and lever 66. This reversing movement of levers 66 and 67 will result in increasing the tension on spring 71 to such an extent that when the cam 70 moves out of engagement with lever 67, the tension of spring 71 will move lever 67 by means of lever 66 to tripping position, as shown in dotted lines in Fig. 5. When the lever 67 is in tripping position, the rotation of a pin or extending member 72 affixed to the shaft 49 moves the lever 67 in a horizontal plane, whereby the cam gear 44 is rotated sufficiently far so that the teeth of the cam gear 44 mesh with the teeth of the pinion gear 48, after which the pinion drives the cam gear 44 through a complete revolution to effect a record-changing cycle heretofore described.

As appears in Fig. 4, a fixed stop 73 is secured to the base plate 10 with an upturned end 74 positioned in the path of movement of the lever 67. The stop 73 serves the purpose of maintaining the lever 67 in the position shown in dotted lines in Fig. 5 so that the pin 72 may engage and move the lever 67 and therewith the cam gear 44 to initiate a record-changing cycle. As the cam gear 44 rotates and the cam 69 is moved out of engagement with the lever 67, the cam 70 in rotating with the pinion 48, engages the end of the lever 67 and moves the lever in a clockwise direction (Fig. 4) to the position shown in Fig. 4. When lever 67 is in this position it is ready to cooperate with the tripping mechanism to set the record-changing apparatus into operation after the next record is played.

The detailed construction of the clutch 65, previously referred to in connection with Figs. 3 and 9, will now be described in greater detail. An annular end portion 75 of the lever 67, which is affixed to the shaft 15, serves as a base for the clutch. A spacer 76, which has a lower and an upper tubular portion, encircles the shaft 15 and the bottom of the lower tubular portion of said spacer rests on the annular end portion 75. A fiber washer 77 which encircles the lower tubular portion of the spacer 76 also rests on the annular end portion 75. The annular end portion of the lever 67 is adapted to rotate around the shaft 15 and rests on the washer 77. A fiber washer 78 also encircles the spacer 76 and is placed over the annular end portion of lever 67. The fin portion of the spacer 76 extends in a horizontal plane above the fiber washer 78. The fin portion is spaced above the annular end portion 75 so that the washers 77 and 78 and the lever 67 fit snugly as shown in Fig. 9. The snugness permits lever 67 to rotate only against the friction with washers 77 and 78. The annular end portion of lever 66 is adapted to freely rotate around shaft 15 and is positioned above the fin portion of the spacer 76. A flanged sleeve 79 is affixed to the shaft 15 and engages the upper tubular portion of spacer 76. The upper tubular portion of spacer 76 is of sufficient axial length to permit lever 66 to rotate freely around shaft 15. An upturned ear 80 is integrally affixed to the annular end portion of lever 66. The spring 71 is fixed to the ear 80 and the wall of the flanged portion of sleeve 79. Normally the spring 71 holds the ear 80 in engagement with a pin 81 provided on the wall of the flange portion of sleeve 79. However, when the cam 70 moves levers 67 and 66 in counterclockwise direction (Fig. 9) ear 80 is moved out of engagement with pin 81 against the increased tension on the spring 71. When the cam 70 moves out of relationship with the levers 66 and 67 while the stylus of the pickup arm is located in the playing area of a record, the tension on spring 71 is just sufficient to restore ear 80 into engagement with pin 81 without moving lever 67 into tripping position. But when cam 70 moves out of relationship with the levers 66 and 67 and the stylus of the pickup arm has moved into the tripping groove of a record, the tension on spring 71 is sufficiently great to swing lever 66 with sufficient force to move lever 67 into tripping position as shown in dotted lines in Fig. 5. The flanged sleeve 79 is fixed to the shaft 15 in a predetermined position so that cam 72 begins to strike lever 67 before the stylus of the pickup arm reaches the tripping groove of a record.

When the record-supporting brackets 19 and 20 are in the position shown in Fig. 1, they are capable of supporting a stack of 10-inch records. When the brackets 19 and 20 are rotated manually 90° in a counterclockwise direction, they are capable of supporting a stack of 12-inch records.

When the brackets 19 and 20 are rotated manually 90° in a clockwise direction from their position for supporting a stack of 10-inch records, the brackets 19 and 20 are in position to permit easy removal of the played record from the turntable.

As shown in Fig. 4, the brackets 19 and 20 are locked in their predetermined positions by the provision of a locking cam 82 secured to the lower end of the shaft 21, which supports the bracket 20 at its upper end. The cam 82 is provided with notches 83, 84 and 85, which are engaged by a pin 86 fixedly secured to the right-hand end of a lever 87. The lever 87 is pivotally mounted to the base plate 10 at 88. A spring 89, which is affixed to the left-hand end of the lever 87 and a suitable fixed member, normally biases the pin 86 into continuous engagement with one of the notches 83, 84 or 85. When the notch 83 engages the pin 86, the brackets 19 and 20 are in position to support 10-inch records. When the notch 84 engages the pin 86, the brackets 19 and 20 are in position to support 12-inch records; and when the notch 85 engages the pin 86, the brackets 19 and 20 are out of record-supporting position, thus allowing easy removal of the played records from the turntable.

It will be noted that the left-hand end of the lever 87 extends into engagement with a set screw 90 which is provided near the lower end of the lever 60. The contour of the cam 82 is such that the left-hand end of the lever 87 allows less clockwise movement of the lever 60 under the action of the spring 89, when the apparatus is set to operate on 12-inch rather than 10-inch records. Thus it is evident that through the cooperation of cam 82 and the levers 87 and 60, the manual positioning of the brackets 19 and 20 for supporting either a stack of 10-inch or 12-inch records automatically sets the mechanism for positioning the pickup arm 14 in proper position to engage the outermost groove of the size of record that is about to be played.

Fig. 4 clearly shows the manner in which the

link chain 23 connects the sprocket wheels 22—22, which are fixedly secured to the lower ends of the shafts 21—21. The link chain 23 is maintained under tension by a pair of idler pulleys 91—91.

In addition to the automatic tripping mechanism previously described, there is also provided a manual, spring-biased tripping lever 92 (Fig. 4). The lower end of this lever is bent to extend upwardly through a slotted aperture 93 in the base plate 10. To this bent end of the lever 92 is affixed a knob 94 (Fig. 1). The lever 92 is normally biased by a spring 95 out of engagement with an ear 96 provided near the bent end 68 of the lever 67. However, the lever 92 may be manually moved about its axis 97 to engage the ear 96 of the lever 67, thereby moving the bent end 68 of the lever 67 into engagement with the end of the cam 69, as shown in dotted lines in Fig. 5, to manually trip the mechanism and initiate a record-changing cycle.

The general mode of operation of the record-changing apparatus will now be described. The following description is directed to the record-changing apparatus when it is set to operate on 10-inch records. After a stack of records has been placed upon the supporting brackets 19 and 20 (Fig. 2), and a record 12 has been placed in playing position upon the turntable 11, the pick-up arm 14 is manually moved to place the stylus in the outermost groove of the record.

The pickup arm 14 moves inwardly as the stylus follows the spiral groove. When the tripping groove is reached, the automatic tripping mechanism is actuated by the movement of the levers 66 and 67 (Fig. 4) in response to the movement of the pickup arm 14. This results in the bent end 68 of the lever 67 engaging the end of the cam 69, shown in dotted lines in Fig. 5. Thereafter the pin 72 engages and moves the bent end 68 of lever 67 and therewith the pinion gear 48 until the teeth of the gear 44 mesh with the teeth of the continually rotating pinion gear 48. Thereafter, the cam gear 44 is driven through a record-changing cycle.

As the cam gear 44 rotates, the cam surface 51 (Figs. 3 and 4) moves the lever 52 and raises the pin 56, thereby lifting the pickup arm 14 off of the record.

Continued movement of the cam gear 44 causes the cam surface 63 to move the L-shaped lever 60 and therewith the lever 57 to swing the pickup arm 14 in a horizontal plane beyond the edge of a record on the turntable.

Shortly thereafter the pin 43 (Fig. 8) on the cam gear 44 moves the cam 42 which in turn, by means of pin 40, transmits reciprocatory motion to the plunger 27. The reciprocating plunger 27 engages the edge of the lowermost supported record and moves this record in a direction normal to the axis of the centering spindle 24 (Fig. 2) sufficiently far so that the record drops off of the supporting bracket 19. The record in falling pulls the record off of the supporting bracket 20. The completely released record then drops by gravity and is guided by the centering spindle 24 into playing position upon the turntable 11.

The cam gear 44 has by this time rotated sufficiently far so that the cam surface 63 (Fig. 4) allows the L-shaped lever 60 to move clockwise under the biasing action of the biasing spring 64, to return the pickup arm 14 to a position where the stylus is over the outermost groove of the record just placed upon the turntable.

At this time, the cam surface 51 (Fig. 3) has rotated to the point where the lever 52 permits the pin 56 to drop, moving the stylus of the pick-up arm 14 into engagement with the outermost groove of the record. Immediately thereafter, the cam gear 44 comes to rest in the position shown in Fig. 4 and reproduction of the record just placed on the turntable takes place.

The next and following cycles of automatic operation are actuated by the automatic tripping mechanism each time the stylus moves into the tripping groove of the record.

While there has been described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is therefore aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In an automatic phonograph having a turntable and a movable pickup arm for cooperating with a record on said turntable; the combination of a continually movable member; a projection movable with said movable member; a cam means adapted to be brought into driving engagement with said movable member, a clutch associated with said pickup arm; a coupling member adapted to be brought into the path of said projection and maintained out of engagement with said cam means by said projection while said pickup arm is cooperating with the playing groove of a record on said turntable; and a spring-biased connecting means associated with said clutch and said coupling member for cooperating with said projection to move said coupling member into engagement with said cam means when said pickup arm reaches a predetermined distance from the center of said turntable, whereby said coupling member and said movable member cooperate to move said cam means into driving engagement with said movable member.

2. In an automatic phonograph having a turntable and a movable pickup arm for cooperating with a record on said turntable; the combination of a continually movable member; a projection movable with said movable member; a cam means adapted to be brought into driving engagement with said movable member; a coupling member frictionally associated with said pickup arm and adapted to be brought into the path of said projection and maintained out of engagement with said cam means by said projection while said pickup arm is cooperating with the playing groove of a record on said turntable; and a spring-biased member movable with said pickup arm and adapted to move said coupling member and to be moved thereby, said spring-biased member and said projection cooperating to move said coupling member into engagement with said cam means when said pickup arm reaches a predetermined distance from the center of said turntable, whereby said coupling member and said movable member cooperate to move said cam means into driving engagement with said movable member.

3. In an automatic phonograph having a turntable and a movable pickup arm for cooperating with a record on said turntable; the combination of a continually movable member; a projection

movable with said movable member, a cam means adapted to be brought into driving engagement with said movable member; a coupling member frictionally associated with said pickup arm and adapted to be brought into the path of said projection and maintained out of engagement with said cam means by said projection while said pickup arm is cooperating with the playing groove of a record on said turntable; a spring-biased member movable with said pickup arm and adapted to be moved relative thereto against the biasing force applied to said spring-biased member, said spring-biased member and said projection cooperating to move said coupling member into engagement with said cam means when said pickup arm reaches a predetermined distance from the center of said turntable; and an extending member associated with said movable member for engaging said coupling member after said coupling member is moved into engagement with said cam means for moving said cam means into driving engagement with said movable member.

4. In an automatic phonograph having a turntable and a movable pickup arm for cooperating with a record on said turntable; the combination of driving means movable with said turntable; actuating means adapted to be moved into operative engagement with said driving means; coupling means slidably connected to said pickup arm and adapted to be moved into the path of said driving means and maintained out of engagement with said actuating means by said driving means while said pickup arm is cooperating with a playing groove of a record on said turntable; and means bias-connected to said pickup arm and associated with said coupling means and adapted to move said coupling means into engagement with said actuating means when said pickup arm reaches a predetermined distance from the center of said turntable whereby the driving means cooperates with said coupling means to move said actuating means into engagement with said driving means.

5. In an automatic phonograph having a turntable and a movable pickup arm for cooperating with a record on said turntable; initiating apparatus comprising a driving means rotatable with said turntable; coupling means slidably connected with said pickup arm and being movable thereby a predetermined distance in a first direction into the path of said driving means during a revolution of said turntable when said pickup arm is tracking a playing groove of a record on said turntable and more than said predetermined distance in said first direction during a revolution of said turntable when said pickup arm is tracking the tripping groove of a record on said turntable, said driving means moving said coupling means relative to said pick-up arm said predetermined distance opposite to said first direction after said coupling means is moved into the path of said driving means; means bias-connected to said pickup arm and associated with said coupling means for moving said coupling means in said first direction a distance greater than said predetermined distance when said pickup arm reaches a predetermined distance from the center of the turntable; and actuating means normally out of operative engagement with said driving means and adapted to be engaged by said coupling means when said coupling means is moved more than said predetermined distance in said first direction whereby said driving means and said coupling means cooperate to move said actuating means into operative engagement with said driving means.

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